## TÍTULO

Fasceíte necrotizante causada por *Photobacterium damselae*: o primeiro caso descrito em Portugal e uma revisão do tema

## TITLE

Necrotizing fasciitis caused by Photobacterium damselae: the first report in Portugal and a review

b) Autoria:

- Dr. Diogo Guimarães, Médico Interno de Cirurgia Plástica Reconstrutiva e Estética no Centro Hospitalar Universitário Lisboa Central, Lisboa, Portugal

- Dr Luís Ribeiro, Médico Interno de Cirurgia Plástica Reconstrutiva e Estética no Centro Hospitalar Universitário Lisboa Central, Lisboa, Portugal

- Dr. Luís Vieira, Médico Interno de Cirurgia Plástica Reconstrutiva e Estética no Centro Hospitalar Universitário Lisboa Central, Lisboa, Portugal

- Dr. Ruben Coelho, Médico Assistente Hospitalar de Cirurgia Plástica Reconstrutiva e Estética no Centro Hospitalar Universitário Lisboa Central, Lisboa, Portugal

c) Os autores não receberam qualquer subsídio para a realização deste trabalho

d) Autor responsável: Diogo Guimarães

Morada: Rua Melvin Jones, nr 8, 6-A, 1600-867 Lisboa

Email: diogoandradeguimaraes@gmail.com

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## ABSTRACT

Necrotizing fasciitis is a severe infection that requires emergent surgical treatment and results in death in a great number of patients. There are several microorganisms which can cause this infection, *Photobacterium damselae* being one of them, with only 8 cases previously reported in the literature. In the present article a case of necrotizing fasciitis by this microorganism is reported, the first infection by this microorganism reported in Portugal. In this case report the patient has survived after serial debridement procedures and reconstruction of the upper limb with acellular dermal matrix and skin graft. We also perfomed a review of the *Photobacterium damselae* soft tissue infection reports as well as the clinical presentation, diagnosis, pathophysiology and treatment of necrotizing fasciitis.

## RESUMO

A fasceíte necrotizante é uma infeção grave que requer tratamento cirúrgico emergente, sendo responsável por uma elevada taxa de mortalidade. Existem vários microorganismos que podem ser responsáveis por este tipo de infecção, sendo o *Photobacterium damselae* um destes, com apenas 8 casos descritos na literatura de fasceíte necrotizante por este agente, sendo o presente relato a primeira vez que é reportada uma infeção a este agente em Portugal. No presente caso o paciente sobreviveu após várias intervenções de desbridamento cirúrgico e reconstrução do membro superior com matriz dérmica acelular e enxertos de pele. Foi ainda realizada uma revisão de todos os relatos de infecção de tecidos moles por este agente, bem como um resumo da apresentação clinica, diagnóstico, fisiopatologia e tratamento da fasceíte necrotizante.

## KEYWORDS:

Fasciitis, Necrotizing; Hand Injuries; Bacterial Infections; Photobacterium; Vibrio Infections

## INTRODUCTION

Necrotizing fasciitis is a rare infection that requires emergent surgery. Delay in diagnosis can lead to loss of life or limb. The infection involves the fascia and subcutaneous tissue, sparing the underlying tissues. Risk factors include immunosuppression, peripheral vascular disease, diabetes mellitus, chronic liver disease, and intravascular drug abuse.

Necrotizing fasciitis is often polymicrobial although group A β-hemolytic *Streptococcus* is the most common microorganism group identified in isolation1.

The subspecies *piscicida* of the bacterium *Photobacterium damselae* (*P. damselae*) is a well-studied fish pathogen, causing a zoonosis known as “fish pasteurellosis” 2. Human diseases caused by *P. damselae* subspecies *damselae* are rare, with only 14 patients with soft tissues infection reported in literature.

## CASE DESCRIPTION

A 65 years old man, fisherman, independent in activities of daily living, was transferred to the emergency department of our hospital because of pain and edema in his right hand. There was mention to a previous history of renal transplantation 16 years before, and to a regimen of blood dialysis for the last 2 year through an arterial-venous fistula in the right arm. His regular medication was lisinopril, alprazolam and bicalutamide.

At the admission the patient complained of progressively worse right hand edema and severe pain, with 6 hours of evolution. He mentioned a trauma to that hand 12 hours before in table where fish were being handled.

At our observation he presented with edema of the right hand, reduced amplitude and strength on movements of the wrist and all the fingers. The fingers had good perfusion and no sensitive deficits. There was a small wound in the dorsum of the hand (Fig. 1). The blood tests at admission date had a white blood cell (WBC) counts of 10,770x10^9/L with 86% neutrophils; LDH 355U/L and a C reactive protein (CRP) of 31,1mg/L. A swab was collected. About 2 hours after the admission, the patient was taken to the operating room and fasciotomies of the hand and wrist were performed with some drainage of “washing-dishes like” fluid. Empiric antibiotherapy with amoxicillin/clavulanic acid and metronidazole was initiated.

About 15 hours after admission skin necrosis in the dorsum of the right hand and progression of edema to the forearm was observed. The patient developed a septic shock and was taken emergently to the operating theatre for debridement (Fig. 2). A preliminary identification of *P. damselae* was possible and we initiated the antibiotherapy regimen directed to the agent with ceftriaxone and doxicicline.

At day 10 and 17 after admission he was again submitted to surgical interventions for debridement. From the 17th day onwards a regimen of negative pressure therapy was started. The antibiotherapy was stopped at day 21. At day 25 an acellular dermal matrix (ADM) was applied with vacuum (Fig.3). Four weeks later, the hand and forearm were skin grafted (Fig. 4). The patient was discharged from the hospital 70 days after admission after a total of 6 surgical interventions (Fig. 5).

## DISCUSSION

Necrotizing fasciitis frequently appears only as low grade cellulitis, and can be very challenging to make an early diagnosis. Across two series, the most common examination findings at the time of presentation were warmth (97%), erythema (95–100%), edema (82%) and disproportionate pain (98–100%)1,3. Patients are frequently hemodynamically unstable with elevated (WBC) counts, coagulopathy, and shock. Skin necrosis, bullae, crepitus, gas on imaging studies and hemodynamic instability, suggestive signs of necrotizing fasciitis are not always present. In fact one or more of these signs are present less than 50% of the time4. It is thought that vascular thrombosis leads to skin sloughing, blistering, ischemia, and resultant necrosis, leading to the clinical signs described 5.

Laboratory markers can aid in diagnosis, sodium values less than 135 and (WBC) greater than 15,400 are the best predictors of necrotizing soft tissue infections 4. The LRINEC scale was develop in an attempt to help in the diagnosis, however, due to its low sensitivity and specificity its value is often questioned 6,7. Whenever the doubt persists, a formal diagnosis of necrotizing fasciitis can be made on microscopic examination of biopsied fascia 8.

Perhaps more specific of this diagnosis is during debridement the gray fat and liquified pus with “dishwater” appearance along the fascial planes, while frank pus is uncommon 5.

An intensive care unit is recommended to monitor vital signs and administer antibiotics and vasopressors as necessary. Planned, staged debridements every 24 to 48 hours of affected limbs are expected, with an average of 3–4 debridements per patient 1,9,10. Antibiotherapy should be initiated empirically until retrieve of cultural results. As described in a recent update11 the Empiric antibiotic treatment should be broad (eg, vancomycin or linezolid plus piperacillin-tazobactam or a carbapenem; or plus ceftriaxone and metronidazole), as the etiology can be polymicrobial (mixed aerobic–anaerobic microbes) or monomicrobial (group A streptococci, community-acquired MRSA)11. Mortality from necrotizing fasciitis usually ranges from 23 to 76%, with organ failure and sepsis consisting in the major causes of death 12. The factors mostly associated with increased mortality are delay in diagnosis, delay in surgical debridement, advanced age and 2 or more comorbilities1.

In 1981 an “un named marine *Vibrio*” was isolated as the causative agent of a human infectious case 13, posteriorly identified as *P. damselae.* A good review of the soft tissues infections by this agent was made by Hundenborn *et al* 14in 2013, reporting 11 infection cases. In the 11 cases reported, 8 (73%) had a fatal outcome. In the 3 patients who could be cured, 1 needed an amputation of the arm. When a search with the terms “photobacterium damselae OR vibrio damselae” is runned on PUBMED database and it is selected only the case reports we retrieve 27 results, of which only 14 are skin or soft tissue infections in human.

The majority of the cases occurred in coastal areas of the United States of America, Australia, and Japan. As far as we could research, no previous infection with this microorganism was previously described in Portugal.

## Legend:

Fig.1: Clinical presentation at admission, 12h after injury

Fig. 2: Presentation after debridement

Fig. 3: Presentation after reconstruction with acellular dermal matrix

Fig. 4: 2 months post-op

Fig. 5: 6 months post-op

## REFERENCES

1. Wong, C.-H. *et al.* Necrotizing fasciitis: clinical presentation, microbiology, and determinants of mortality. *J. Bone Joint Surg. Am.* 85, 1454–60 (2003).

2. Love, M. *et al.* Vibrio damsela, a Marine Bacterium, Causes Skin Ulcers on the Damselfish Chromis punctipinnis. *Science* 214, 1139–40 (1981).

3. Childers, B. J. *et al.* Necrotizing fasciitis: a fourteen-year retrospective study of 163 consecutive patients. *Am. Surg.* 68, 109–16 (2002).

4. Chan, T., Yaghoubian, A., Rosing, D., Kaji, A. & de Virgilio, C. Low sensitivity of physical examination findings in necrotizing soft tissue infection is improved with laboratory values: a prospective study. *Am. J. Surg.* 196, 926–930 (2008).

5. Gonzalez, M. H. Necrotizing fasciitis and gangrene of the upper extremity. *Hand Clin.* 14, 635–45, ix (1998).

6. Wong, C.-H., Khin, L.-W., Heng, K.-S., Tan, K.-C. & Low, C.-O. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score: a tool for distinguishing necrotizing fasciitis from other soft tissue infections. *Crit. Care Med.* 32, 1535–41 (2004).

7. Tsai, Y.-H., Hsu, R. W.-W., Huang, K.-C. & Huang, T.-J. Laboratory Indicators for Early Detection and Surgical Treatment of Vibrio Necrotizing Fasciitis. *Clin. Orthop. Relat. Res.* 468, 2230–2237 (2010).

8. Chauhan, A., Wigton, M. D. & Palmer, B. A. Necrotizing Fasciitis. *J. Hand Surg. Am.* 39, 1598–1601 (2014).

9. Angoules, A. G. *et al.* Necrotising fasciitis of upper and lower limb: A systematic review. *Injury* 38, S18–S25 (2007).

10. Elliott, D. C., Kufera, J. A. & Myers, R. A. Necrotizing soft tissue infections. Risk factors for mortality and strategies for management. *Ann. Surg.* 224, 672–83 (1996).

11. Stevens, D. L. *et al.* Executive Summary: Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America. *Clin. Infect. Dis.* 59, 147–159 (2014).

12. Fontes, R. A., Ogilvie, C. M. & Miclau, T. Necrotizing soft-tissue infections. *J. Am. Acad. Orthop. Surg.* 8, 151–8 (2000).

13. Morris, J. G. *et al.* Illness caused by Vibrio damsela and Vibrio hollisae. *Lancet (London, England)* 1, 1294–7 (1982).

14. Hundenborn, J., Thurig, S., Kommerell, M., Haag, H. & Nolte, O. Severe Wound Infection with Photobacterium damselae ssp. damselae and Vibrio harveyi, following a Laceration Injury in Marine Environment: A Case Report and Review of the Literature. *Case Rep. Med.* 2013, 610632 (2013).